

The Canadian Entomologist

Vol. LV.

ORILLIA, OCTOBER, 1923.

No. 10.

A CURIOUS PHASE OF PARASITISM AMONG THE PARASITIC HYMENOPTERA

BY L. O. HOWARD,
Washington, D. C.

It has previously been pointed out by the writer and by others that the history of the evolution of parasitism with the Hymenopterous families now composed principally of true parasites can be traced to-day through the different phases which exist at the present time. The beginning of parasitism can be found in the case of certain forms of the subfamily Eurytominae inhabiting Cynipid galls, and there are other species which have acquired the parasitic habit which are catholic in their choice of hosts, others which have become adapted only to host insects living in a certain manner, while others confine themselves in their attacks to certain families; others to the species of certain genera, and others to single species.

In the whole order Hymenoptera, however, it would be difficult to find so advanced a degree of parasitism as occurs with a minute Proctotrypid of the subfamily Scelioninae which parasitizes *Mantis religiosa* in Europe. The Scelioninae for the most part are egg parasites, and the parasitic habit is confined to their larvae, which feed within the eggs of the host insects (mostly Orthoptera) and issue as free-living adults whose short life is spent for the most part in mating and oviposition. The little form in question, which is known as *Rielia manticida* of Kieffer, has a true ecto-parasitic life in its adult stage, and its habits are carefully displayed by L. Chopard in an article on the parasites of the praying Mantis in the "Annals of the Entomological Society of France," Volume 91, pp. 249-272.

The adults of the parasite, which are fully winged, though flying feebly, issue about the end of August and through September at about the period when the praying Mantis becomes adult. Whether they reach the female Mantids by flight or whether they crawl upon them from the twigs of shrubs upon which both occur is in doubt, but probably the latter, in the same way as the triungulins of the blister-beetles crawl upon bees. Having succeeded in grasping one of the Mantids, it becomes from then on a true parasite, living at the expense of its host, and never leaving it until it is time for it to lay its eggs. It soon loses its wings, and in the late autumn all that are found upon the Mantids are wingless. The late Alfred Giard thought that the wings were rubbed off by the movements of the segments of the host, but Chopard says that this cannot be true, since the *Rielia* wings are cut off at a precise point and in a neat way, so that they appear to have been cut with a pair of scissors. He thinks, therefore, that they fall off in the way that the wings of ants fall off, although at a little distance from the base.

The little parasites are generally found more abundantly upon the females than upon the males of the Mantids, and often more than one parasite is found upon a single host, very often two or three, more rarely four or five, and some-

times six. The *Rielias* fix themselves under the wing, or under the elytron, upon the sides of the thorax, and not rarely at the end of the abdomen between the anal valves. Where several of them occur upon a single host, they choose locations distant from one another. The Mantis notices the attack of the *Rielia* by vigorous movements when sensitive points are touched, as the sides of the abdomen. It tries to remove them with its legs, and sometimes it succeeds.

The parasite may live for several months without leaving its host, and undoubtedly takes nourishment from it. Chopard has seen it eating the base of the wing-veins of its host.

The adult *Rielia* is then a parasite, and one whose fate depends closely upon that of the host which it has attacked, for its destiny is very different when it has attached itself to a male rather than a female. If it happens to attach itself to a male, whose life, normally short, is usually cut *very* short by the fact that it is eaten up by the female in the act of coupling, the life of the *Rielia* is also very short and ineffective. One would think that it would change from male to female during the act of coupling, but this is not done by the parasite. In the same way, in a case where one of the parasites was found upon an immature Mantis, it was not able to change its place with the casting of the skin, and remained fixed upon the exuvium.

The eggs of the Mantis, to the number of one thousand to twelve hundred, are deposited in two or three successive batches in egg-cases formed of a spumy mass which hardens like parchment in the air. These egg-layings are usually made during October and November.

About half an hour before laying her eggs, the abdomen of the Mantis contracts violently, and this is a signal to the parasites to quit their shelter under the wings of the host. They travel slowly along the sides of the abdomen and seek to reach the genital region of the host insect. The Mantis, in fact, seems to feel their presence at the time, but she is so intent upon her egg-laying that she makes only a feeble attempt to brush them off with her legs. However, Chopard has seen the egg-laying interrupted in this attempt, and sometimes the female succeeds in throwing the parasite off, but usually the parasite succeeds in reaching the egg-case which is being formed and which is at first of a viscous nature, and in the middle of this semi-liquid mass continually moved about by the abdomen of the Mantis the *Rielia* finds itself about to be swallowed up by the sticky stuff, but finally it lays its eggs, probably in the eggs of the Mantis.

The parasite tries to remove the gluey substance from its body and to climb back on its host. Often it fails, and dies. If, on the contrary, it is able to regain the body of the Mantis, it finds its usual place and then tries to remove the accumulation which has dried upon the surface of its body and clogs its legs and its antennae. Sometimes it does not succeed, and Chopard has seen one with one antennae permanently put out of business. Now we see another good reason for its having rid itself of its wings at an earlier stage, for the wings would be hopelessly clogged by the secretion of the Mantis.

The larvae of the *Rielia* are to be found in the eggs of the Mantis. Chopard describes the different stages, but has not succeeded in finding the pupa. He thinks, however, without doubt, that pupation occurs in the egg of the Mantis and that it lasts only about fifteen days.

CYPHODERRIS MONSTROSA UHLER IN BRITISH COLUMBIA
(ORTHOPTERA)

BY E. R. BUCKELL,

Entomological Branch, Ottawa.

Cyphoderris monstrosa Uhl.

- Uhler, Proc. Ent. Soc. Philad., II, p. 552 (1864).
Walker, Cat. Derm. Salt. Brit. Mus. II, p. 248 (1869).
Thomas, Proc. Davenp. Acad. Nat. Sci. I, p. 263 (1876).
Scudder, Can. Ent., XXXI, p. 117, (1899).
Scudder, Cat. Orth. U. S., p. 80 (1900).
Scudder, Can. Ent. XXXIII, pp. 17-19 (1901).
Scudder, Psyche, IX, p. 167, (1901).
Turley, Can. Ent. XXXIII, pp. 246-248 (1901).
Caudell, Ent. News, XV, p. 63 (1904).
Caudell, Jour. N. Y. Ent. Soc., XII, p. 47 (1904).
Ent. Record, Rep. Ont. Ent. Soc. p. 131 (1907).
Buckell, Proc. B. C. Ent. Soc. p. 32, No 18, Systematic Series (1921).
Buckell, Proc. B. C. Ent. Soc. p. 9, No. 20, Systematic Series (1922).

During the past four years the writer has found this insect in many localities in the interior of British Columbia and has been able to assemble some notes on its life history and habits. It has also been possible, from the examination of a long series of specimens, to observe considerable variation in the coloration and roughness of the surface of the pronotum; particularly in that of the male. The original description of this species was made by Uhler from the male in 1864 and it was not until 1901 that the female became known. No descriptions are given in this article, as both generic and specific descriptions have been published by Mr. A. N. Caudell, in the Journal of the New York Entomological Society, p. 47, Vol. XII, 1904. A description of the coloration of the living female is also given in the above publication by Professor Scudder and again on p. 18 of the Canadian Entomologist for 1901.

NOTES ON VARIATIONS

A few specimens of this species have been collected from time to time in British Columbia at elevations ranging from 1,000 to 7,500 feet. Among these there were no marked variations either in the coloration or size of the individuals. On May 26, 1922, the writer collected fifty adult males and thirty adult females at Nicola, B. C., at an elevation of 2,200 feet and it is with regard to this series that the following remarks are made. The series was obtained at night between the hours of nine and twelve by searching with a strong gasoline lantern amongst the bushes of *Amelanchier cusickii*, *A. florida* and *Elaeagnus argentea*, which were growing close to the Nicola River and on which the insects were feeding. The whole series was collected on about two acres of land, and at this date all stages from small nymphs to adults could be found. These eighty adults were retained in five per cent. chloral hydrate solution until December, when they were all carefully measured and the results tabulated. The measurements of the eighty specimens will not be included here, but will be quoted from to show the variation in measurements which was found in this series.

THE FEMALE

The measurements of a typical large female were: Length to end of cercus, 35.0 mm.; length of pronotum, 8.0 mm.; greatest width of pronotum, 8.5

*--Contribution from the Division of Field Crop and Garden Insects, Entomological Branch, Dept. of Agric., Ottawa.

mm.; tegmina vestigial; length of hind femur, 11.5 mm.; length of hind tibia, 10.5 mm.; length of hind tarsus, 7.5 mm. The small nymphs are very soft and light colored and easily distinguished from the adult. In the last instar a large nymph closely resembles a small adult in general size and coloration, but may readily be separated by the following characters. They are softer and lighter in color and always have the markings on the face and legs a dark brown instead of the rich shining black of the adult. The surest way to decide if the specimen is adult is to examine the ventral surface. In the nymph the coxae, trochanters and sterna are pale clay yellow and any markings that are present are light brown; while in the adult the coxae and trochanters are shining black or a very dark purple, and the sterna are pinkish marked with black, and the whole insect has a harder and more burnished appearance. In the thirty females examined the total length was variable according to the age of the specimen and the presence or absence of eggs within the body cavity. The largest specimen measured: Total length, 35 mm.; length of pronotum, 8.0 mm.; greatest width of pronotum, 8.5 mm.; hind femur, 11.5 mm. The smallest specimen measured: Total length 28.0 mm.; length of pronotum, 6.0 mm.; greatest width of pronotum, 6.0 mm.; hind femur, 8.5 mm. The average measurements for the thirty females were: Total length, 28.866 mm.; length of pronotum, 7.45 mm.; greatest width of pronotum, 7.416 mm.; hind femur, 10.266 mm.

There is no constant color pattern shown in the pronota of the females. In some the ground color is considerably darker than in others and the intensity and distribution of the dark markings is very variable. In all the specimens examined from British Columbia the tegmina and wings are vestigial. It is interesting to note that the specimen described and illustrated by Caudell (Fig. 1, p. 50, Jour. N. Y. Ent. Soc. Vol. XII, 1904) has the tegmina and wings partially developed. It is stated that "the elytra are fairly well developed, nearly black, projecting well beyond the thorax and slightly overlapping; the wings of the same development and shape as the elytra, being about as broad as long and nearly round. Those specimens with minute, widely separated elytra almost hidden beneath the thorax I have considered as nymphs, though some are fully as large as the single undoubted adult before me. These supposedly immature forms differ from the adult in having undeveloped wings and the legs are usually shorter, the posterior femora of even the larger specimens being in some cases scarcely more than 8.0 mm. in length. It is possible that this species is in the midst of the evolutionary process of becoming apterous, as indicated by the aborted underwings of the male. In this case the female with more fully developed wings may be a case of reversion to the ancestral type, in which case the supposedly immature forms may really be adults." There is no doubt that the thirty British Columbian females, here considered, were fully adult and the hind femora were all 9.5 mm. or over, except in three specimens in which they were 9.0 mm. The femora of nymphs, as stated by Caudell, rarely exceeded 8 mm.

THE MALE

In the series of fifty males, which we are considering, there is considerable variation shown in the distribution of the dark markings on the pronotum and in the rugosity of the surface of its posterior lobe. There is also considerable variation in the total length of the body and in the length of the hind femora.

In examining the pronota of this series, we find that there are three color varieties which gradually grade one into the other. The first variety is by far the most plentiful, sixty-two per cent. of the specimens falling into this division. In these the posterior lobe is either (A) nacreous, (B) luteous or (C) a pale pinkish-brown and is sharply separated from the dark anterior lobe.

In the second or intermediate variety the average specimen shows a more gradual graduation of color from the dark anterior lobe to the lighter, though strongly infuscated, posterior lobe. Being an intermediate variety, it was found hard to place some specimens with certainty, but thirty-two per cent. of the series were considered to fall within this variety; specimens could be found grading imperceptibly into both the lighter variety and the dark variety.

The third, or dark variety, was rare in this series, only three specimens or six per cent. being found. In two of these the anterior and posterior lobes were uniformly black with two slightly lighter areas in the centre. In the pronotum of the third specimen the anterior lobe is slightly darker but less shiny than the posterior lobe, and is, in many respects, intermediate.

Other points of variation can be noticed in the general shape of the pronota and in the rugosity of the posterior lobes. In the series having light pronota, individuals could be found showing variations from a weakly punctate posterior lobe but little rugose, through various degrees of roughness to one that is coarsely ridged longitudinally. In three specimens with light pronota the posterior lobe was considerably flattened and the greatest width was across the hind border, and in these individuals the coarse ridging was particularly pronounced. In the intermediate series of sixteen species no outstanding variation in the degree of roughness was noticed.

In summing up the characteristics of the fifty males no definite varieties can be picked out from this series in which size, color of pronotum, and rugosity are constant in more than one or two specimens. Those in the first series (A), (B) and (C) contain small, medium and large specimens, with the posterior lobe usually weakly punctate to strongly punctate, or occasionally coarsely ridged longitudinally. Both size and rugosity of pronotum are variable in the second and third series, but none have been seen as yet with the coarsely ridged pronotum. The three dark males were among the smallest specimens measured.

The described variety, *Cyphoderris monstrosa piperi* Caudell, the description of which appears in the Jour. N. Y. Ent. Soc., p. 53, Vol. XII, 1904, was not found in the series under discussion, although the main points in which it is said to differ from the type specimens of *C. monstrosa* Uhler are to be found in some of the British Columbia individuals, but never united in one specimen. Its greater size is equalled and in some cases exceeded in the series before us. Its black coloration of the pronotum is found in at least two specimens of the series, but not accompanied by a large or coarsely ridged posterior lobe, while its broad posterior lobe conspicuously and coarsely ridged longitudinally is shown only in the three specimens with light colored pronota. It is doubtful in our opinion whether *C. monstrosa piperi* can be considered a true variety.

The largest specimen in the series of males examined measured: Length to end of cercus, 35 mm.; length of pronotum, 9.0 mm.; greatest width of pronotum, 8.5 mm.; length of tegmina beyond pronotum, 11.0 mm.; length of hind femur, 12.5 mm. This specimen had a very light colored posterior lobe of

the pronotum which was very slightly punctate. The smallest specimen measured: Length to end of cercus, 21 mm.; length of pronotum, 7.0 mm.; greatest width of pronotum, 6.5 mm.; length of tegmina beyond pronotum, 7.0 mm.; length of hind femur, 8.5 mm. The average measurements for the fifty males were: Length to end of cercus, 25.78 mm.; length of pronotum, 8.184 mm.; greatest width of pronotum, 7.81 mm.; length of tegmina beyond pronotum, 8.36 mm.; length of hind femur, 10.67 mm. Another specimen measured: Total length, 35.0 mm.; length of pronotum, 9.0 mm.; greatest width of pronotum, 8.0 mm.; length of tegmina beyond pronotum, 11.0 mm.; length of hind femora, 12.00 mm.; length of hind tibia 11.0 mm.; length of hind tarsus, 7.5 mm.; length of cercus, 3.5 mm. This specimen belonged to the intermediate variety as regards coloration of pronotum. The tegmina of the male are broad and ample and cover from one half to two thirds of the abdomen. The right tegmen may overlap the left or vice versa. The stridulating area is well developed. The wings are shrunken, wrinkled and useless and are far more developed in some specimens than in others.

LIFE HISTORY AND HABITS

The notes obtained on the life history of this insect are far from complete but may be of interest at this time, as little is known about this species. As far as we have been able to ascertain in British Columbia, the periods during which the egg, the nymph and the adult are present are not very well defined; the nymph, at any rate, can be found throughout every month of the year.

No observations have been made on the place chosen for oviposition. The large body of the female and the very short ovipositor would indicate that the eggs are probably either deposited on the soil surface beneath rubbish or logs, or more probably are all laid in one batch in some underground chamber excavated by the female, but this needs to be verified. Dissection of dried females shows that they contain from 45 to 50 eggs. These eggs are all of the same size, which would favor the idea that all are laid at one time and not a few at a time, as occurs in other British Columbia Tettigoniidae, such as the members of the Decticinae, in which the eggs are found in all stages of development within the bodies of the females. The dried eggs measure 4 mm. by 2 mm. and are a dark golden brown color, but the fresh eggs would, probably be considerably larger.

Oviposition probably commences in the middle of May and continues throughout June and July and females with mature eggs have been found in early September. There does not seem to be much doubt that the eggs laid late in the summer do not hatch until the following spring, as very small nymphs can be found in May and June which become adult in July. The earliest adults undoubtedly result from the over-wintering nymphs, which can be found in early spring stiff and dormant in their hibernating galleries beneath stones and logs. These overwintering nymphs are usually in the last instar and soon become adult when spring opens. A hibernating nymph was found beneath a small stone in the forest at Riske Creek, Chilcotin, on April 12th, 1921. At this time the snow was still covering most of the ground and the stone was firmly frozen to the soil. The nymph, a male in the last instar, was resting in a smooth, sloping gallery excavated in the soil beneath the centre of the stone. The gallery was about four inches long and sloping gently downwards. The nymph at this time was

very weak and sluggish. In the spring of 1922 several of these were found in short galleries beneath stones on a rocky hilltop on the Nicola range, at an altitude of 3,500 feet. In this location the wind would keep the hilltop fairly free from snow, and as the temperature falls in this locality to fifteen or twenty degrees below zero for several short periods during the average winter, these hibernating nymphs are able to stand a considerable amount of severe cold. Very small nymphs have occasionally been found beneath logs in early spring, and may have wintered in this stage or may possibly have hatched in some underground gallery and grown slightly by feeding on grass roots or other vegetable matter. We have no evidence to show that adults ever hibernate. The nymphs remain hidden during the daytime and come out at dusk, and may be found in great numbers during late May, in company with the earlier adults, feeding upon the flowers of various bushes, especially species of *Amelanchier*. When disturbed they drop to the ground and crawl under the debris at the base of the bushes. When further annoyed they throw themselves upon their backs and extend their legs out rigidly and make jabs at the intruder with their front pair of legs and their powerful mandibles. This same method of defence is used by the adult insect also, and their powerful jaws are capable of giving the finger a severe pinch.

The habits of the adults are similar to those of the nymphs, the day being spent in short burrows beneath stones, under logs or amongst rubbish. They are very slow and clumsy while upon the ground, but can climb freely into the bushes or into the highest trees. Motionless adults on the ground are very hard to detect even with a strong light at night, as their colors blend admirably with the dead twigs and leaves. When the *Amelanchier* bushes are in flower these insects, both nymphs and adults, may be seen in large numbers at night feeding upon the flowers of these bushes, and the air will be filled with the loud shrilling of the males. When stridulating the male rests head downward on a tree trunk or branch and by the vibration of its tegmina produces a shrill ticking sound somewhat similar to that made by the Cicadas. The sound is very ventriloquial and the cinger hard to detect. Very little attention is paid to a bright light. In collecting the series at Nicola a 300 candle-power gasoline lantern was used and could be brought to within six feet of the stridulating males before they would become silent. By taking care not to shake the bushes no difficulty was experienced in gently taking the specimens required with the fingers.

The adults emerge at dusk and the males begin to stridulate. Between 8.30 p.m. and 11 p.m. the stridulating is at its height. After midnight they become silent and probably retire to their hiding places before the chill morning hours. It is only when flowering bushes are in blossom that large numbers can be found together. After the blossoming period they become scattered and are hard to find in any numbers.

Pairing of the sexes takes place soon after dusk and the females may oviposit at night or perhaps during the day time when below ground, but this point has not yet been determined. We do not know if pairing takes place upon the ground or in the bushes, but it is evidently a similar process to that employed by the *Decticinae*, as a number of female *Cyphoderris* have been seen by us with the large, white, albuminous mass adhering to them while feeding on *Amelanchier*.

flowers soon after dusk. Another insect which pairs in a similar way at dusk in British Columbia is *Scudderia furcata* Bruner.

During the period when this species is most plentiful it may be found in all types of country from the Rocky Mountains in the east to the Coast Range in the west. We have no records of it at present from west of the Coast Range. It seems to be equally at home in the dry belt and in the more humid sections of the Province. Its normal habitat is evidently timbered land. In the Chilcotin district a number of them were found during the day hiding under loose stones and dried cattle manure on the open range, although they were never far from the timbered hills.

This species is known from Banff, Alberta, and from Washington, Oregon, Idaho and Wyoming in the United States. No damage has as yet been reported from this species in British Columbia, but considerable damage to the buds and flowers of cherry, peach, apple and pear trees has been reported from Idaho.

THE LIFE HISTORY OF *JALYSUS SPINOSUS* (SAY). (NEIDIDAE, HETEROPTERA)

BY P. A. READIO,

Kansas University, Lawrence, Kansas.

Late in September of the fall of 1922 the writer discovered that the stilt-bug, *Jalysus spinosus* (Say), was present in large numbers in the vicinity of Lawrence, Kansas, feeding for the most part on *Gaura biennis* L. All stages of the insect were represented, and it seemed to be an excellent opportunity to obtain some of the much-needed data on the biology of this insect and the family which it represents. Although the lateness of the season made it improbable that a complete life cycle could be witnessed before cold weather, yet the lack of information concerning this insect made the attempt worth while.

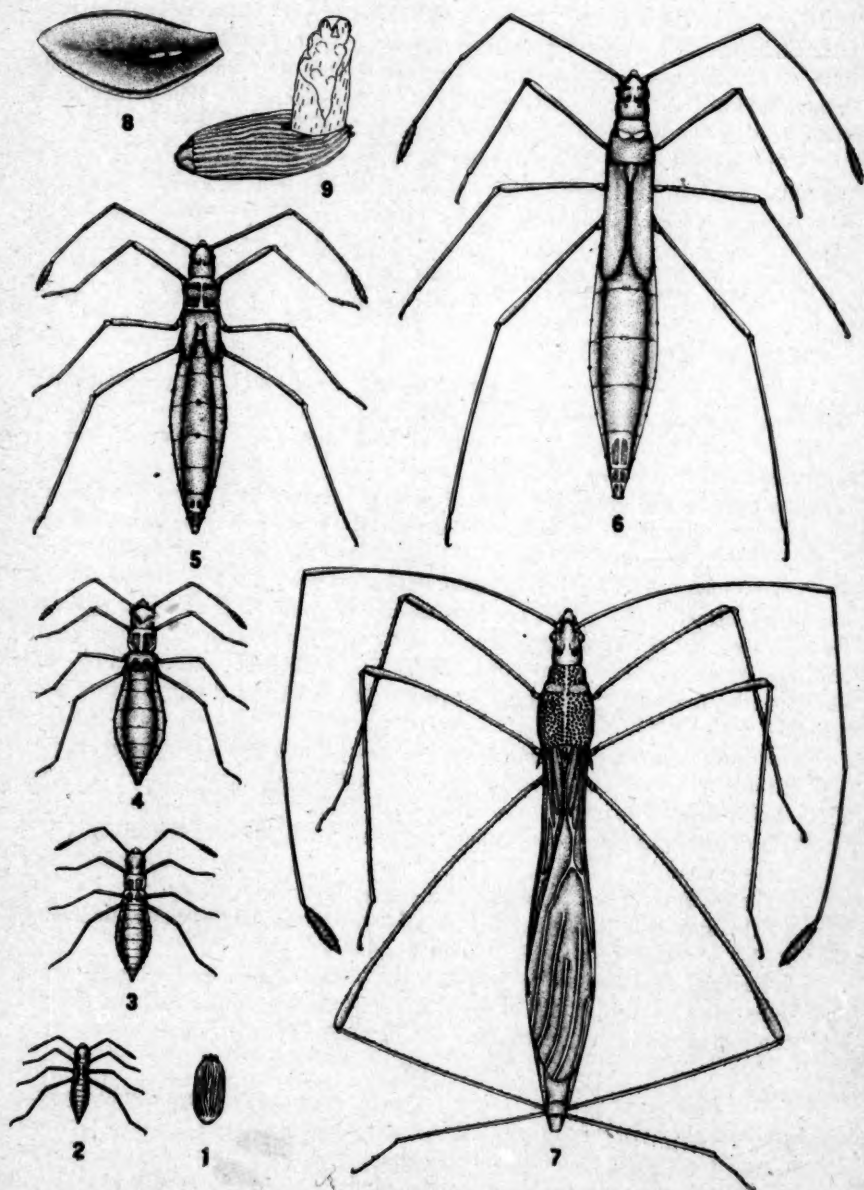
In a survey of the literature dealing with the biology of this family, a few references to the biology of European species were found, but practically nothing in regard to our species. E. A. Butler, in an article, "A Contribution Towards the Life History of *Berytus clavipes* F."¹ has described the eggs and nymphal instars of this English species, and in a later article² has described the eggs and first instar nymphs of *Berytus signoretti* Fieb.¹ Other observations on the life history of this family have been made by Moncreaff, on *Metatropis rufescense*, Herr.-Schaff., and by Sahlberg on the same species. In this country practically nothing has been done on the life history of any member of this family. Howard, in "Insect Life," states that *Jalysus spinosus* is often "Found on the undergrowth in oak woods," and "would be a good species to study carefully." Corstock in his "Manual for the Study of Insects," states that *Jalysus spinosus* is "Found on the undergrowth of woods and in meadows." Because of the lack of information concerning the life history of this and other American species of this family, the writer has made this brief study.

SYSTEMATIC POSITION.

Jalysus spinosus (Say) belongs to the family Neididae, formerly the family Berytidae, of the order Heteroptera. The following descriptive remarks con-

1—Ent. M. Mag., 49, pp. 28-32. 1913.

2—Ent. M. Mag., 50, pp. 220-221. 1914.



JALYSUS SPINOSUS (SAY).

cerning the family are given by McAtee in his "Key to the Nearctic Genera and Species of Berytidae."³

"The Berytidae are an assemblage of small to medium sized bugs of slender build. The long filiform antennae are distinctly elbowed and the head has a definite constriction or transverse sulcus in front of the ocelli. The first joint of the antennae and the femora are clavate, and the slender legs are more or less thickly beset with short bristles or bristled tubercles. The scutellum is small, leaving the triangular space between the clavi partly open.

"It has been the custom to refer to certain metathoracic tubercles of the Berytidae as breathing-horns, or the equivalent of that term in various languages. It is evident, however, that these organs in their entirety are exact homologues of what are called in the other groups of the Heteroptera possessing them "ostioles," with their accompanying canals and tubercles, which are believed to be the orifices through which the odoriferous secretions of the bugs are given off."

McAtee describes the genus *Jalysus* Stal as follows:

"Front of vertex with or without spine; thorax with distinct callosities; sides and median line very low carinate and area within humeri elevated; scutellum with short, sharp, posteriorly inclined spine; elytra spineless, corium not conspicuously punctate; ostiolar process shorter, less curved, and not twisted, canal entirely on the outer side, apex of process a rather long spine; beak nearly or quite attaining hind coxae; no indication of rostral position on under side of head; sulcus beginning at middle of prosternum, narrow and shallow between fore coxae; much wider on metasternum, flanked on each side by 5-6 indentations, abruptly contracted as it passes between the middle coxae, then widened again on metasternum, but not attaining width of part anterior to coxae, the whole meso- and metasternal parts of sulcus with distinct, carinate edges; sulcus fairly well developed on first abdominal segment, percurrent, with broad flat longitudinally wrinkled margins."

McAtee separates the two species in this genus by the following key:

"Front of vertex with a long, sharp, sometimes decurved spine; scutellar spine depressed, almost horizontal *elongatus* Barber.

"Front of vertex without spines, scutellar spine inclined at an angle of 45 degrees *spinosus* Say."

The additional description of the species *spinosus* follows:

"This species is distinguished from all others in the United States by having the ostiolar process tipped with a distinct spine.

"General color, yellow brown, with last antennal joint except its base and apex, eyes, apex of corium, tips of tarsi, and sometimes irregular spots on thorax, and longitudinal vittae on venter, fuscous to black. Length 7-9 mm."

LIFE HISTORY

Host Plants and Feeding Habits: *Jalysus spinosus* has been found feeding on three host plants in this vicinity. These are *Gaura biennis* L., *Gaura coccinea* Pursh., and *Oenothera biennis* L., the Evening Primrose. It is worthy of note that all three of these plants belong to the family Onagraceae. The eggs have been found on *Gaura biennis* and *Oenothera biennis*, but not on *Gaura coccinea*.

In feeding the insects of all stages gather in clusters around the buds
3—Journ. of N. Y. Ent. Soc., XXVII, pp. 79-92.

and seeds. They seem to feed but little, if any, on the leaves and stems, preferring the other parts when they can get them.

Seasonal Life History: Because of the fact that the present observations were made only from late September into the winter months, parts of the seasonal life history are in doubt. The insect hibernates, as do the greater number in this order, in the adult stage under grass and leaves in protected places. They can be found during the winter months among and under the leaves of common mullein, which forms a winter rosette sought as shelter by a good many insects. They are present in the field until late in the fall in all stages; eggs, all stages of the nymphs, and adults having been observed in late October. However, as the colder weather comes, they become fewer in number and finally disappear from the food plants. The latest date upon which they were observed was November 5th, and the last individuals seen were fifth instar nymphs. It is assumed that the adults had already gone into winter quarters and that the smaller nymphs had been killed by the cold weather, while the larger nymphs remained on the food plants only until their final molt could take place. The time of emergence in the spring has not been determined, nor has the number of generations, though it is probable that there are several during the year.

Eggs: The eggs of this species are laid on the food plant, usually attached to the stems or the seeds. They appear to be parallel to the surface to which they are attached, but in reality are inclined at a slight angle, the caudal end being attached and the cephalic end free. Oviposition has been observed and noted. The ovipositing female takes a firm stand, appearing to lean forward on her long, slender legs. At the beginning of oviposition she applies the tip of her abdomen to the surface upon which the egg is to rest, forces the egg out until it comes in contact with the surface, and then becomes motionless for a while. During this time the sticky secretion which fastens the egg to the plant is exuded, allowed to flow around the exposed end of the egg and glue it in place. After the egg is attached the female slowly bends her body still farther forward and actually withdraws her abdomen from around the egg, rather than forcing the egg out. The entire operation takes from two to three minutes. The eggs are laid singly, characteristically, but occasionally two or more are seen side by side or end to end.

The eggs (Figs. 1, 8 and 9) are elongate oval, 0.9 mm. long by 0.3 mm. wide, only slightly, if any, wider at the cephalic end than at the caudal end. They are marked with numerous longitudinal furrows which run the entire length of the egg. At the cephalic end there is a group of four knob-like prominences which are bent inward. These knobs are probably micropylar in function. The eggs are a translucent white when first laid, but in a few days take on a yellowish tinge, which gradually deepens until it becomes a deep yellow just before hatching. The eye spots also show through as red dots in the later days of the development of the embryo.

The number of eggs laid by a single female has not been determined satisfactorily. The greatest number laid by any female in the laboratory was twelve, but it is probable that in the field more eggs are laid. The length of time before hatching varied from seven to ten days, and the average length of time for all the eggs which hatched in the laboratory was eight and one-third

days. This, also, may vary somewhat from the length of time necessary for hatching in the field.

In hatching, a longitudinal split occurs near the cephalic end and the nymph works its way out through this split with its head foremost. It emerges at right angles to the long axis of the egg, and before it is entirely clear of the shell the post-natal molt takes place. The exuvium of this molt is left attached to the old shell and appears as an indefinite, ephemeral membrane.

Length of Nymphal Instars: As has been mentioned before, the season was late when this work was begun, and consequently it was thought wise to run the life history by installments. Consequently mating pairs, eggs, and all stages of the nymphs were started simultaneously with the idea of piecing the life history together in case the cold weather should put a sudden stop to it. Fortunately, however, the complete life cycle of a single individual, from adult to adult, was obtained, in addition to the fractional data.

The period between mating and oviposition is short. In case a mating pair were isolated one day, eggs would be found in their container the next. Egg laying was continued over a period of from two to four days in the insectary.

Records of ten nymphs passing through the first instar are available. The minimum length of time necessary was three days and the maximum eleven days. The average for the ten individuals was seven and one-half days.

Two days were required as a minimum and eleven as a maximum for the second instar. The average of ten specimens was four and eight-tenths days.

A minimum of two days, a maximum of nine, and an average of five days for nine specimens was required for the third instar.

The fourth instar required three days as a minimum, nine days as a maximum and four and eight-tenths days as an average of nine individuals.

The fifth instar required four days as a minimum, ten days as maximum and seven and six-tenths days as an average of ten.

The story of the life of the individual that completed its life cycle is as follows:

On September 30th a mating pair was isolated and fed. On October 1st three eggs were found in their container; on October 2nd three more eggs, and on October 3rd, one more egg, making a total of seven laid by this female. On October 10th, eight days after being laid, the three eggs laid October 2nd hatched. Two of the nymphs died in the first instar. The other molted to the second instar on October 17th, seven days; to the third instar on October 25th, eight days; to the fourth instar on October 27th, two days; and finally to the adult on November 4th, five days. This gives a total of thirty-three days from adult to adult. The length of time from the emergence of the adult to the pairing of individuals has not been determined. The length of time of this life cycle indicates that there is ample time for several generations during the summer, as is probably the case.

DESCRIPTIONS OF THE INSTARS

First Instar (Fig. 2): Range in size, 0.9 mm to 1.2 mm.; general shape nearly cylindrical, abdomen slightly swollen in older individuals; general color light yellow with the legs, antennae, beak, upper thoracic segments and tip of

the abdomen darker, and the eyes red. Head bluntly rounded, vertex very broadly rounded, two converging white lines run diagonally caudad from the eyes, nearly meet, and continue parallel to each other to the caudal margin of the head. Pronotum larger than mesonotum which in turn is larger than metanotum; a median, light line runs the length of the thorax. Legs and antennae long and narrow, but proportionately not so long nor so narrow as in the later instars and adult; tarsi two-segmented as is the case in the nymphal instars but not in the adult, where the tarsi are three-segmented; beak four-segmented as in all nymphal instars and adult. The abdominal spiracles are visible laterally but are rather inconspicuous; the upper surface of the body, legs and antennae are clothed with fine, short hairs.

Second Instar (Fig. 3): Range in size, 1.6 mm. to 2 mm.; general shape of body narrowly pear-shaped; general color light yellowish-green with legs, antennae and beak fuscous and eyes red. White lines on head as in first instar. Pro-, meso- and metanotum as in first instar with proportional increase in size. Abdominal spiracles more easily visible than in first instar; openings to stink glands, which are easily visible in the third instar, now very indistinct; fine hairs present on body, legs and antennae.

Third Instar (Fig. 4): Range in size, 2.3 mm. to 3.1 mm.; general color light green with legs, antennae, beak and tip of abdomen fuscous and with a white line running the length of the body, eyes red; body somewhat more elongate than in the preceding instars. Converging white lines on head as in preceding instars. Wing pads beginning to appear, mesothoracic wing pads longer than metathoracic, do not cover first abdominal segment. Openings to stink glands now conspicuous on the posterior margins of the third and fourth abdominal segments; spiracles conspicuous laterally on the segments of the abdomen; three tip segments of abdomen bear dark dorsal plates which bear hairs; fine hairs on the upper surface of the body, the legs and antennae.

Fourth Instar (Fig. 5): Range in size, 3.9 mm. to 4.6 mm.; general color light green with legs, antennae, beak and tip of abdomen fuscous and with a median white line running the entire length of the body, eyes red. Converging white lines present on head, vertex rounding, no trace of the ocelli, which appear in the fifth instar. Pronotum darker, lateral margins white-lined, wing pads larger, all extending to the middle of the second abdominal segment, the first pair nearly hiding the second. Openings of stink glands present on the posterior margins of the third and fourth abdominal segments, openings enclosed in a white circle; spiracles of abdominal segments conspicuous laterally; tip three segments of abdomen with darker dorsal plates bearing a few hairs; fine hairs present on upper surface of body, legs and antennae.

Fifth Instar (Fig. 6): Range in size, 6 mm. to 6.9 mm.; general color greenish with legs, antennae, beak, wing pads and tip of abdomen fuscous, eyes red, an interrupted white line running the length of the body; body, legs and antennae very long and narrow, approximating condition in the adult. Vertex more pointed than in the preceding instars, a suture running from the side of the head just below the eyes in a caudo-mesad direction until it nearly reaches the median line, then turning cephalad for a short distance; ocelli present just caudad of this suture. Lateral margins of the prothorax white-lined; at right angles to the median white line are two dark, curved lines which extend nearly

to the lateral margins; wing pads much larger than in the preceding instar, nearly equal in length and similar in shape, median and lateral margins of each nearly parallel, reach middle of third abdominal segment. Openings of stink glands conspicuous, in the same position as in the preceding instar; a single opening in each segment; spiracles easily visible but not as conspicuous as in the preceding instar; seven pairs present on abdominal segments two to eight; three dorsal plates present at the tip of the abdomen bearing hairs.

REVIEW OF LIFE HISTORY

Jalysus spinosus (Say) is an herbivorous insect, having been found feeding on three host plants. *Gaura biennis*, *Gaura coccinea* and *Oenothera biennis*. It winters as an adult under leaves. Its elongate-oval eggs are glued to the stems and seeds of the host plants, and are characterized by longitudinal furrows and four button-like knobs at the cephalic end. In from seven to ten days the egg hatches leaving a post-natal molt skin attached to the shell. There are five nymphal instars, each of which requires from two to eleven days for completion, the average length of time necessary for each being five days. The length of time necessary for a single individual to run through its life cycle from adult to adult is thirty-three days. There are probably several generations a season.

EXPLANATION OF PLATE

- Fig. 1. Egg of *Jalysus spinosus* showing longitudinal furrows and micropylar knobs.
 Fig. 2. First nymphal instar. Fig. 3: Second nymphal instar. Fig. 4: Third nymphal instar. Fig. 5: Fourth nymphal instar. Fig. 6: Fifth nymphal instar. Fig. 7: Adult.
 Fig. 8. Two eggs of *Jalysus spinosus* attached to seed of *Gaura biennis*.
 Fig. 9. Egg after hatching of nymph showing exuvium of post-natal molt attached to shell.

A NEW DOLICHOPODID FROM ONTARIO (DIPTERA)*

BY C. HOWARD CURRAN,

Ottawa, Ont.

Dolichopus lundbecki n. sp.

Infra-orbital cilia black; front purplish; hind femora with two or three preapical bristles, with long black cilia below; last joint of fore tarsi compressed, of small size. Allied to *pachynemus* Loew but that species has three joints of fore tarsi compressed, only one preapical bristle on hind femora.

Length, 5-5.5 mm. *Male*. Face not wide, silvery yellowish white, black just below the antennae. Front metallic violet, the orbits and just above the antennae greenish, rather dull. Antennae black, less than the lower half of the first joint and the base of the second joint below, reddish yellow; third joint one and one-half times as long as wide, convexly tapering to acute point, the arista inserted at apical third. Occiput grey pollinose, the green ground color not very evident; orbital cilia wholly black. Palpi reddish yellow.

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

Mesonotum rather dark green, with four bronze-purple vittae, the median ones approximate and complete; the whole lightly grey pollinose. Pleura largely blackish, partly green, rather thickly whitish pollinose. Squamae yellow with black cilia. Halteres yellow.

Legs reddish yellow. Fore coxae with a small black spot at base on outer sides, entirely clothed with small black bristles in front, and five long apical ones. Middle and hind coxae black with yellow apices. Posterior femora with a small apical black spot above; middle and hind femora each with three preapical bristles in a longitudinal row; hind femora with long black cilia on lower inner side, the cilia not dense, longer than the width of the femora. Apical fifth of hind tibiae black; middle tibiae with one bristle on ventral surface about the apical third; posterior tibiae swollen, widest at basal third, the bristles on their outer surface arranged in two rather regular rows, the hairs on the ventral surface rather long; fore tarsi longer than their tibiae, yellow, only the fifth joint black; basitarsi as long as the two following joints, the remaining joints each successively a little shorter; fifth joint nearly twice as long as wide, its apex rounded, widest sub-apically, gradually tapering to the base; front tarsi slender; middle tarsi black from tip of first joint, their basitarsi without a bristle above; hind tarsi wholly black.

Wings with a small, enlongate enlargement before the tip of the first vein; fourth vein bent slightly beyond its middle. Posterior margin of the wing very deeply excised before the tip of the sixth vein; it is gradually narrowed from the tip of the fifth vein to a point immediately behind the inner end of the costal swelling, the sixth vein is surrounded by a large roundish lobe.

Abdomen metallic green and purple black, the latter color occupying each segment on either side of the incisure and forming a less deeply colored middle vitta. The green color is thinly white pollinose. Genitalia black; their lamellae similar to *D. pachynemus* (see fig. 82, Bull. 116, U.S.N.M.), but perhaps slightly longer.

Female. Face wider, its sides almost parallel, silvery white; second antennal joint not at all yellow in my specimen. Otherwise, similar, the legs plain, the last joint of the fore tarsi very slightly enlarged.

Holotype and Allotype, "Mer Bleue," Ottawa, Ontario, June 7, 1923. (Curran), No. 613, in the Canadian National Collection, Ottawa.

This species is most distinct from any so far described and should be readily recognized by the black orbital ciliae, front tarsi and wing pattern. It traces out to *D. pachynemus* in the Van Duzee, Cole and Aldrich key, (Bull. 116, U. S. N. M.). The ♂ may be readily separated by the presence of three bristles before the end of the middle and hind femora, only apically black tibia, etc. *D. pachynemus* has three joints of the front tarsi compressed, only a very slight wing lobe and the hind tibiae are widest at the middle. The ♀ traces out to *bruesi* V. D., C. & A., but may be readily distinguished by the violet front, small black spot above apex of hind femora, and black tipped tibiae.

I take great pleasure in naming this species for Dr. William Lundbeck, whose excellent Monographs of Danish Diptera are so well known.

NEW SPIDERS FROM CANADA AND THE ADJOINING STATES, No. 3.

BY J. H. EMERTON,
Boston, Mass.

Since the second paper of this series was published in 1919 many Canadian spiders have passed through the writer's hands, among which several species appear to be undescribed, but have waited for publication in the hope that more specimens of the same kinds might be found. The new *Grammonota* from the southern end of James Bay is represented only by one of each sex, though it is probably abundant like other species of the genus. Three other species are known by only one male each. The three *Cybaeus* have long been described and named, but much new material makes it easier to distinguish the species and so new descriptions and figures have been given.

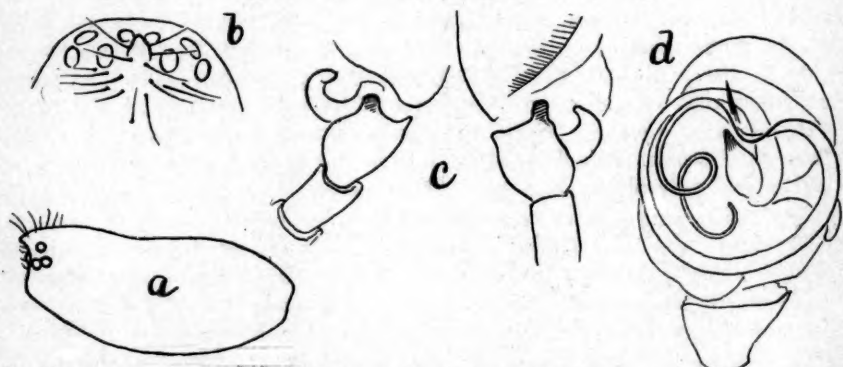


Fig. 1.—a, *Metapobacterus pacificus*, side of cephalothorax; b, top of head showing short horn; c, tibiae of male palpi; d, under side of palpal organ.

***Metapobacterus pacificus* n. sp.**

Cephalothorax 1 mm. long. Color light yellow without any markings on cephalothorax or legs. The cephalothorax has the head slightly raised and with a short, pointed horn directed forward between the upper eyes, which are twice as far apart as they are from the lateral eyes. The front row of eyes is shorter than the upper row and has the lateral pair larger and the middle pair smaller than the eyes of the upper row. (Fig. 1, a, b.) The sternum is as wide as long and extends backward between the posterior coxae, which are their diameter apart. The abdomen is broken off and lost. The male palpus has the tibia a little longer than wide with a short, dark process at the outer corner and a smaller uncolored one on the inner corner. (Fig. 1 c.) This differs from the tarsus in *Cornicularia*, which genus is suggested by the process on the head. The palpal organ has a long tube, which coils over the under side of the palpal organ in one and a half turns. (Fig. 1, d.)

One male only. Terrace, B.C., Mrs. Hippisley, 1920.

***Gongylidium columbianum* n. sp.**

3 mm. long. Cephalothorax and legs orange brown, abdomen gray. The cephalothorax is oval and the head low and the general appearance is much like *Gongylidium macrochelis* Em. described in Canadian Entomologist, Aug. 1917. The mandibles are stout and have a long tooth on the front near the lower end,

curved inward and downward. The front of the mandibles is roughened with short elevations. (Fig. 2, a.) The male palpi have the patella long with a slight spur at the end on the under side. The tibia is twice as long as wide and extends in a hook over the tarsus with a sharp point and a tooth on the inner side. (Fig. 2, b.) The tarsus is as long as the tibia and the palpal organ is large, extending beyond the tarsus on the under side. The tube is long and slender, curving in two circles around the main part of the organ. (Fig. 2, c.)

One male, Terrace, B.C. Mrs. Hippisley, 1920.

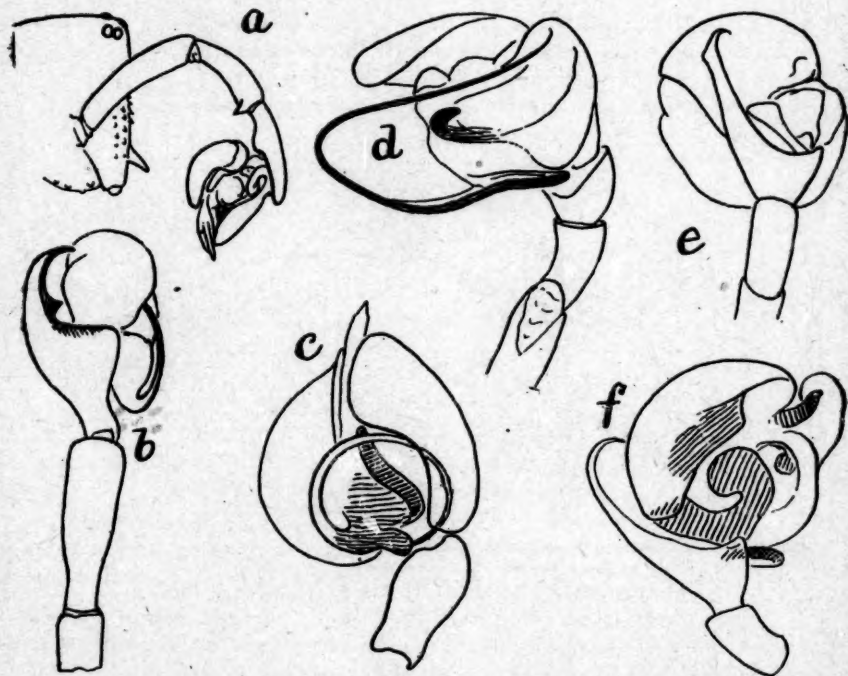


Fig. 2.—a, side of head of *Gongylidium columbianum*; b, c, male palpus of *G. columbianum*; d, e, f, male palpus of *Araconcus pedalis*.

***Araconcus pedalis* n. sp.**

2 mm. long and entirely pale. The cephalothorax is low without any elevation of the head. The eyes are as in *A. bispinosus* Em. (Conn. Acad. 1911), the front row shorter than the upper, the front middle eyes smaller and the upper middle eyes larger than the others. The male palpi are large and resemble somewhat those of *bispinosus*. The tibia is short and has a long, slender process on the outer side which extends over the tarsus. This process widens near the end and beyond this it ends in a sharp, curved point. (Fig. 2, e, f.) The tube is slender and long enough to wind twice around the palpal organ. (Fig. 2, d.) The tarsal hook is small and flat, curving around in a half circle and with a curved tip.

Dauphin, Manitoba, 1919. Mrs. Hippisley.

Grammonota spinimana n. sp.

In size, color and dorsal markings this species resembles closely *Grammonota pictilis*, the common *Grammonota* in spruce trees all over eastern Canada, but is at once distinguished from it by the slightly thickened tibia of the first and second legs in both sexes. The epigynum is distinctly different from that of *pictilis*. (Fig. 3, e.) In the male the thickened first and second legs have two rows of stiff hairs on the under side of tibia and metatarsus, which are about twice as long and twice as thick as the other hairs of the legs. (Fig. 3, a, b.) The head of the male is not elevated behind the eyes as in the males of *pictilis* and *gigas*, but there is a slight projection forward between the front upper eyes. (Fig. 3, a.) The male palpus has the tibia somewhat like that of *pictilis* with the dorsal tooth larger and the outer process shorter and turned outward. (Fig. 3, c.) The palpal organ is much like that of *G. ornata*. (Fig. 3, d.)

One male and one female only from Moose Island, James Bay, collected by Fritz Johansen in the summer of 1920.

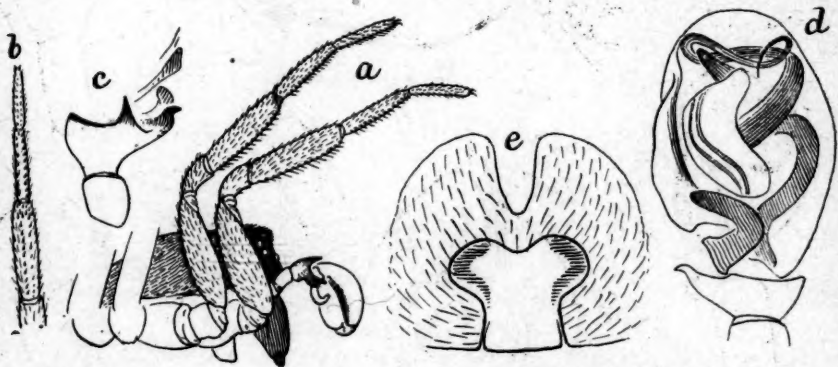


Fig. 3—a, side of male *Grammonota spinimana*; b, first leg of male showing spines on under side; c, tibia of male palpus; d, palpal organ; e, epigynum.

Cybaeus reticulatus, morosus and signifer Simon

These three species of *Cybaeus* form a conspicuous part of the spider fauna of the west coast of Canada. They range from Vancouver Island to Alaska and eastward to the Rocky Mountains, and occur together in many collections as though living together in the same places like the three eastern *Cicurina*. All three were named and briefly described by Simon in the Proceedings of the Entomological Society of Belgium in 1866 and specimens identified by Simon are now in the collection of Nathan Banks with which the recent Canadian specimens have been compared.

Preserved in alcohol, the three species look much alike, all having the same pale yellowish color, with no markings except a row of pairs of light, oblique spots on the back of the abdomen. The characters of the copulatory organs are very distinct. In *reticulatus* the external epigynum is small, with a small opening directed backward, in front of which is a transverse curved ridge. (Fig. 4, b.) In *signifer*, the opening is wider, without any ridge. (Fig. 5, d.) In *morosus* there are two openings at the sides of a middle septum and at the sides of these, two oval depressed areas bordered in front by a curved ridge, making a figure somewhat like a pair of spectacles. (Fig. 5, c.)

The male palpi all have a prominent tooth on the outside of the tibia and a process covered with short points on the outside of the patella. In all three the palpal organ has a process at the base, which rests against the tooth on the tibia, and in all three the tube curves in a half circle across the distal end and is supported by a flat thin process parallel to the edge of the tarsus.

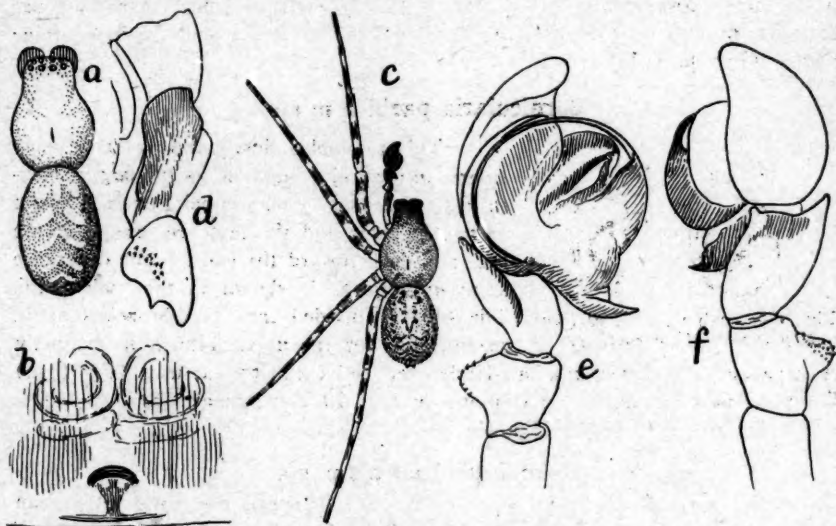


Fig. 4—*a*, back of *Cybaeus reticulatus* ♀; *b*, epigynum of *C. reticulatus*; *c*, *C. reticulatus* ♂; *d*, *e*, *f*, male palpus of *C. reticulatus*.

In *reticulatus*, the palpal organ is large, with a pointed basal process supported by a large tooth on the tibia. The process of the patella turns directly outward without extending forward beyond the end of the joint. (Fig. 4, *d*, *e*, *f*.)

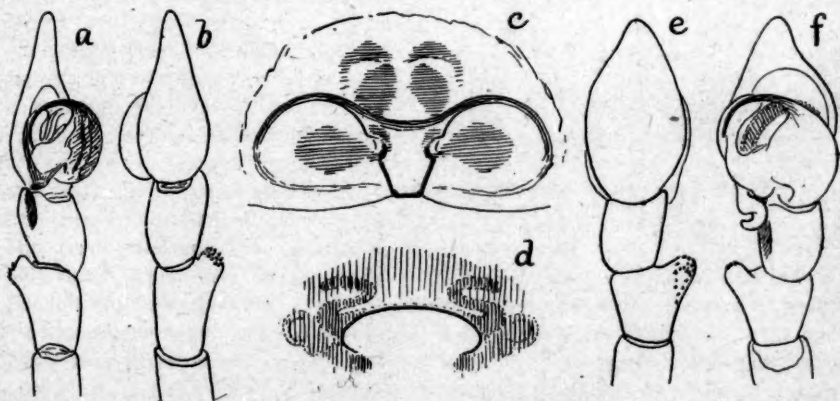


Fig. 5—*a*, *b*, male palpus of *Cybaeus morosus*; *c*, epigynum of *C. morosus*; *d*, epigynum of *Cybaeus signifer*; *e*, *f*, male palpus of *C. signifer*.

In *signifer* the palpal organ is smaller than in *reticulatus*, not wider than

the tarsus, and the tooth on the tibia is correspondingly small. The process on the patella is at the distal end and projects slightly forward beyond the base of the tibia. (Fig. 5, e, f.)

In *morosus*, the whole palpus is more slender and the joints more elongated than in the other species. The tarsus is twice as long as wide, and the palpal organ covers only half its length. The patella is longer than wide and the outer process is at the distal end, extending forward beyond the base of the tibia. (Fig. 5, a, b.)

Cornicularia pacifica n. sp.



Fig. 6—a, palpus of *C. pacifica*;
b, palpus of *C. auranticeps*.

This resembles closely the eastern *Cornicularia auranticeps*, but is a fourth larger, measuring 3 mm. long. The cephalothorax is bright orange in color and the legs are orange at the base and dark toward the ends. The difference from *auranticeps* is shown in the male palpi. The tibia is divided into two branches as in *auranticeps*, but the upper branch is distinctly more slender and curved in a half-circle over the back of the tarsus. (Fig. 6, a.) The same part in *auranticeps* is shown in Fig. 6 b for comparison.

Terrace, B.C., Mrs. Hippisley.

Delorrrhipis bicornis n. sp.

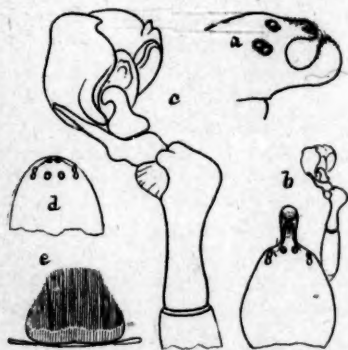


Fig. 7.—a, *Delorrrhipis bicornis*, side of head and horns; b, head from above; c, male palpus from above; d, head of female; e, epigynum.

slightly projecting forward. (Fig. 7, d.) The male palpi are long and resemble those of *monoceros* as figured by Keyserling. The patella is thickened at the end and turned obliquely inward, the tibia is short and has a long, slender process extending over the tarsus. (Fig. 7, c.) The epigynum is covered by a wide, slightly raised plate and shows no external opening. (Fig. 7, e.)

Terrace, B.C., Mrs. Hippisley.

This is the third American *Delorrrhipis*. The first, *D. (Erigone) monoceros* was described by Keyserling from the State of Washington in 1884, and *D. (Tmeticus) unicorn* by Banks in 1892 from Ithaca, N.Y. The present species is 3 mm. long and chestnut brown with somewhat lighter legs. The male suggests a *Diplocephalus*, having the horn larger than in *D. monoceros* and curved upward at the end where it nearly touches a smaller horizontal, upper horn carrying the lower middle eyes. (Fig. 7, a, b.) The female is of the same size and color as the male and has the lower middle eyes unusually high and slightly projecting forward. (Fig. 7, d.) The male palpi are long and resemble those of *monoceros* as figured by Keyserling. The patella is thickened at the end and turned obliquely inward, the tibia is short and has a long, slender process extending over the tarsus. (Fig. 7, c.) The epigynum is covered by a wide, slightly raised plate and shows no external opening. (Fig. 7, e.)

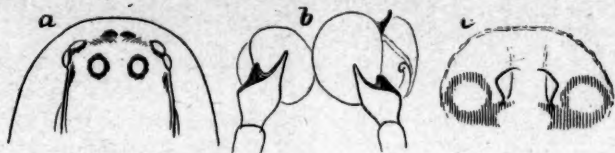


Fig. 8—*a*, *Lophocarenum minimum*, top of head with grooves; *b*, palpi; *c*, epigynum.

***Lophocarenum minimum* n. sp.**

A small species, about 1 mm. long, and pale in color, with the head low and having distinct grooves at the sides leading to shallow pits just behind the lateral eyes. (Fig. 8, *a*.) The male palpi have the tibia longer than wide, extending over the tarsus in two points, the inner one long and slender and the outer blunt and darker in color. (Fig. 8, *b*.) The female has the epigynum as in Fig. 8, *c*, showing openings, with a darkened border, in the middle, and the round spermathecae through the skin at the sides.

Several specimens of both sexes from Terrace, B.C., Mrs. Hippisley.

***Lophocarenum inflatum* n. sp.**

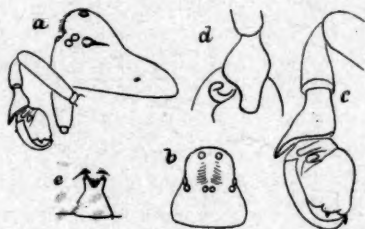


Fig. 9—*a*, *Lophocarenum inflatum*, side of head with grooves; *b*, front of head; *c*, male palpus; *d*, tibia of male palpus from above; *e*, epigynum.

This is a pale species of moderate size, a little over 2 mm. long, with a high head resembling that of *cuneatum* and *abruptum*, with the upper middle eyes near the top of the hump. (Fig. 9, *a*, *b*.) The grooves in the head are short and the pits large and near the lateral eyes. (Fig. 9, *a*.) The male palpi are slender and the palpal organs small. The patella and tibia are together as long as the femur. (Figs. 9, *a*, *c*.) The tibia extends over the tarsus about one-third its length in a truncated point. (Fig. 9, *d*.) The epigynum shows a wide middle lobe, in front of which are two shallow pits. (Fig. 9, *e*.)

Terrace, B. C., Mrs. Hippisley.

THE SPECIFIC NAME OF THE GREEN BUD-WORM

In our Entomological Branch Bulletin, No. 16, entitled "The Apple Bud-Moths and Their Control in Nova Scotia," by G. E. Sanders and A. G. Dustan, the name of the green bud-worm is given as *Argyroplote consanguinana* Wlsm. This determination resulted from correspondence which I had with Mr. A. Busck, of the United States Bureau of Entomology. Recently, however, Dr. J. H. McDunnough, of the Dominion Entomological Branch, has been studying the Eucosmid material in our National Collection of Insects and he informs me that the species which we referred to as *consanguinana* Wlsm., is not this species, but is *variegana* of Hubner. This latter is a common species in Europe and Asia Minor. In England it is known, commonly, as the Allied Bud-Moth. Entomologists, as well as librarians who have the above publication, should note this correction.

ARTHUR GIBSON, Dominion Entomologist.

TWO NEW DIPTERA IN THE CANADIAN NATIONAL COLLECTION,
OTTAWA.BY C. B. D. GARRETT,
Cranbrook, B. C.**Philorus aylmeri** new species.

Male. Eyes bisected about midway. Antennae blackish brown. Rostrum deep yellow, palpi yellow. General colour yellowish, some portions infuscated. Halteres dusky, only the base yellow. Abdominal tergites dark brown, the last segment yellow, almost without hairs; sternites yellow. Legs yellow, shading to darker on the tarsi. Hind tibia with one small apical spur. Basal two-thirds of the claws much swollen, finely pilose along the under side. Coxae yellow, a small black spot on the apex of each in front. Wings very similar to *P. bilobata* of Europe, the submarginal cell long, reaching the RM crossvein; RS over twice as long as the latter. R_{2+3} and R_{4+5} divergent at their tips. Cu_1 appears to rise from the M Cu crossvein, Cu_2 holding the direction of the Cu base to the margin; otherwise as in *bilobata* Lw.

Hypopygium forming a distinct hollow cup; the base above on each side runs out into a long appendage pointing inwards to the middle of the cup; the upper corner of the sternite ends in a pair of long claspers bearing hair on inner margins and on apical half exteriorly; from inside posteriorly the center forms a triangular projection on each side of which is a chitinated piece ending in a round tip.

Holotype—♂, Aylmer Creek Falls, Lake Minnewanka, Banff, Alta., Aug. 30th, 1922, (C. B. D. Garrett), No. 589, in the Canadian National Collection, Ottawa.

The wings of this species are mounted on a slide.

Anorostoma raca new species.

Male. Two frontal orbital bristles, the foremost slightly over half the length of the hind one. One oral vibrissa with single row of fine hairs behind. Prosternal bristle wanting. Mesopleura on the posterior edge near the upper angle with one weak and one strong bristle, above these with two short hairs; otherwise bare except for three hairs below the disc. Propleura bearing one strong bristle and one hair about midway up posterior side. Pteropleura bare; sternopleura with one strong bristle and two to four hairs along the upper edge, centrally with four to six fine hairs running down to many bristles towards the middle. General body color wholly yellowish. Four dorsocentral bristles present, the median two with a slightly brownish spot at their bases; scutellum with two pairs of bristles. Fore femora with a dorsal and lower row of bristles, the middle ones with a median row of strong bristly hairs on the outer (anterior) side and two bristles below this row near the apical end; hind femora with a scattered row of bristles along the dorsal edge on apical four fifths, the legs with moderately long, sparse black hairs elsewhere. The wings, which are somewhat damaged, appear to be hyaline with the crossveins infuscated.

Holotype—♂, Aweme, Man., Aug. 11, 1917, (N. Criddle), No. 890, in the Canadian National Collection, Ottawa.

NEW NORTH AMERICAN DIPTERA*

BY C. HOWARD CURRAN,

Ottawa, Ont.

***Bibio simplicis* new species.**

Head black pilose, body elsewhere pale yellow haired, legs almost all reddish; wings pale brownish.

Length of wing, 6—7 mm. *Male*. Head black pilose, the middle of the occiput and palpi mostly, with yellow or intermixed yellow hairs. Antennae short, robust; last two points of palpi sub-equal, palpi longer than antennae.

Thorax and abdomen shining black, only the sides of the collar whitish yellow, the pile wholly pale yellow, long on the thorax, sparse on abdomen. Upper genital plate with a broad, apically rounded incision on apical two-thirds.

Coxae and trochanters black, yellow pilose. Legs reddish, the apices of the femora, sometimes only obscurely, a dash on the basal two-thirds of the front femora below, sometimes the anterior surface of the fore tibiae on apical half, the last two or three tarsal joints wholly, the preceding one or two apically, black, or the hind tarsi may have only the last joint black, the other tarsi a little more reddish. Front femora rarely somewhat piceous reddish, greatly swollen, scarcely over two and one half times as long as wide; anterior tibia with a large bulbous swelling in the middle below, four times as long as wide, but thicker in the middle than wide, anterior spur as long as the second tarsal joint, the posterior one not over one-fourth as long as the anterior. Hind basitarsus slightly swollen, twice as long as the last joint, the fourth joint of all the tarsi distinctly shorter than the fifth. Tarsi pale haired on reddish portion, black haired on black portions. Pile of femora chiefly yellow, but below, on the front ones, the hind ones wholly, black haired; tibiae black haired, the front ones with chiefly yellow hair. Squamae brown or fuscous with yellow fringe; halteres fuscous.

Female. Front about twice as wide as the width of one eye from dorsal view, with a slender, low median carina which expands above the antennae, with irregular longitudinal strigations on either side, and without conspicuous tubercles. Front black haired, occiput sparsely yellow pilose.

Thorax and abdomen reddish, the margins of both, the postscutellum, apices of the segments of the abdomen, pectus and portions of the pleura, slightly brownish or somewhat piceous. Coxae chiefly reddish, their apices, narrow bases, and the trochanters, piceous; front femora and tibiae slightly larger.

Holotype—♂, Nordegg, Alta., Aug. 1, 1921, (J. McDunnough) No. 588, in the Canadian National Collection, Ottawa.

Allotype—♀, same data, July 26.

Paratypes—6 ♂, same data, July 26, 6 ♂, same data as holotype; 2 ♂, Banff, Alta., Aug. 30, 1909, (N. B. Sanson).

This species is allied to *inaequalis* Loew, but is smaller, the front femora not blackish or brownish, etc. It is nearer *alienus* McAtee but in the type of that species the hind basitarsus is only one and one-half as long as the last joint.

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept., of Agric., Ottawa.

The species of *Bibio* possess few characters suitable for determinations and are extremely difficult to determine accurately from description. Many species appear very much alike and can only be separated by careful study. More than one species may be taken at the same time, which makes the determination even more difficult. I have examined all the types which are at present in America. It will require very careful study of Walker's types before we can be positive of his species and possibly some of those described subsequently will be found to be synonyms.

***Ginglimyia bicolor* new species**

Differs from *G. acrorostris* in wider, dull orange frontal vitta, wider middle portion of face; reddish first two antennal joints, reddish yellow coxae and femora and more yellowish tinted pollen.

Face and cheeks yellow in ground color, the head, except the broad frontal vitta, silvery, the frontal vitta orange, extending along the sides of the ocellar triangle to opposite the hind ocelli; frontal vitta four times as wide as the side stripes, widened on front half. First two antennal joints and base of third reddish; arista black, bare.

Mesonotum greyish yellow pollinose, with four or six darker stripes, the pleura greyish pollinose and more blackish in ground color.

Coxae and femora reddish yellow, the latter darkened above at apex; tibiae brownish red, paler on inside; tarsi all black.

Wings cinereous in front, paler posteriorly; crossvein bent apicad.

Abdomen shining black, the sides of the first segment, the second except a broad, narrowing middle stripe and basal triangles on the third, except usually only the middle third, and sometimes small spots on the anterior angles of the fourth, reddish yellow, basal third or more of the third and following segments yellowish white pruinose.

Holotype—♀, Saanich, B. C., Aug. 13, 1918, (W. Downes), No 593, in the Canadian National Collection, Ottawa.

Paratypes—3♀, same data.

This species agrees almost perfectly with Townsend's generic description. There is some variation in the specimens in the direction of the bristles on the front, and they do not always lie as indicated by Townsend, but the orbitals and verticals may vary considerably.

